Cryptosporidiosis

Section 1: ABOUT THE DISEASE

A. Etiologic Agent

Cryptosporidium parvum, a coccidian protozoan, is associated with human infection of cryptosporidiosis. It was first recognized as a cause of human illness in 1976.

B. Clinical Description

The most common symptom of cryptosporidiosis is profuse and watery diarrhea. Other signs and symptoms include weight loss, stomach cramps, nausea, vomiting, and low-grade fever. Symptoms often present sporadically, but they resolve in fewer than 30 days in most people who are not immunocompromised. Immunodeficiency, especially advanced HIV infection, is associated with an inability to clear the parasite, and the disease may have a prolonged and fulminant clinical course, contributing to death. Asymptomatic infections are common and serve as a source of infection for others. Diagnosis is generally made by the identification of oocysts in fecal smears. Organisms can also be identified in intestinal biopsy tissue. In addition, new and more sensitive enzyme immunoassay (EIA) tests have recently become available.

C. Vectors and Reservoirs

Humans, cattle, and domestic animals are reservoirs.

D. Modes of Transmission

Infected animals and people excrete large numbers of oocysts in stool. The infectious dose is not certain, but it is probably low. Oocysts are relatively hardy and can survive in the environment for weeks or months. They are resistant to concentrations of chlorine and other disinfectants commonly used for drinking water treatment. They can be killed by heat or removed by filtration. The most common mode of transmission is from person to person. Persons become infected by hand-to-mouth transfer of oocysts from the feces of an infected individual, especially in institutions and daycare centers. Person-to-person transmission can also occur through certain types of sexual contact (e.g., oral-anal contact).

Large outbreaks traced to contaminated drinking water have been reported, including an outbreak in Milwaukee in 1993 that reportedly affected 400,000 people. Localized outbreaks may occur from contaminated water, such as stream/lake waters and swimming pools that are open to contamination by human and animal feces. Outbreaks have also occurred from food contaminated by animal feces (e.g., unpasteurized apple cider). An infected food worker could also be a source of foodborne transmission. In addition, zoonotic transmission can occur through contact with feces from infected animals (e.g., for livestock handlers, dairy farmers, veterinarians).

E. Incubation Period

The incubation period is not precisely known; 1–12 days is the likely range, with an average of about 7 days.

F. Period of Communicability or Infectious Period

The disease is communicable for as long as the infected person excretes *Cryptosporidium* oocysts, which generally begins at the onset of symptoms. Oocysts continue to be excreted in the stool for several weeks after symptoms subside, and they may remain infective outside the body for 2–6 months in a moist environment.

G. Epidemiology

Cryptosporidiosis has a worldwide distribution. In developed countries, the prevalence of infection ranges from <1–4.5% of individuals surveyed by stool examination. The prevalence is significantly higher in developing regions of the world. Cryptosporidiosis is still among the most common causes of persistent diarrhea in patients with AIDS in the U.S., but it has become less of a problem since the introduction of anti-retroviral therapy. Children under two years of age, animal handlers, travelers to endemic areas, men who have sex with men, and close contacts of infected individuals are at higher risk for being infected. Outbreaks have been reported in daycare centers and have been associated with public drinking water, contaminated swimming pools, lakes and ponds, and with drinking unpasteurized cider made from apples contaminated with cow manure. It is estimated that 50% of dairy calves shed oocysts and that the parasite is present on more than 90% of dairy farms.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.

Section 2:
REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report a case that meets any of the following criteria:

- Demonstration of *C. parvum* cysts in stool;
- Demonstration of *C. parvum* cysts in intestinal fluid or small-bowel biopsy specimens;
- Demonstration of *C. parvum* antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay or "ELISA");
- Detection of *C. parvum* by PCR; or
- Demonstration of reproductive stages of *C. parvum* in tissue preparations.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI) performs direct fluorescent antibody (DFA) testing for *Cryptosporidium* on clinical specimens associated with case clusters or outbreaks and on other clinical specimens submitted with pre-approval from the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. This DFA test will also identify *Giardia* cysts that may be present in the same specimen. Collection and submission of up to three

specimens over a ten-day period will increase the likelihood of parasite detection. Stools should be submitted in the specimen collection kits distributed by the SLI. Use of any other collection kits must be approved by the SLI prior to specimen submission.

For additional information on specimen submission and testing, call the SLI Parasitology Laboratory at (617) 983-6661.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a contaminated public water supply), and to stop transmission from such a source.

B. Laboratory and Health Care Provider Reporting Requirements

Cryptosporidiosis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of cryptosporidiosis, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Cryptosporidium* infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations *(105 CMR 300.000)* stipulate that cryptosporidiosis is reportable to the LBOH and that each LBOH must report any case of cryptosporidiosis or suspect case of cryptosporidiosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Enteric Disease Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

1. It is the responsibility of the LBOH to complete a MDPH *Enteric Disease Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.

2. Use the following guidelines to assist in completing the form:
   a. Accurately record the demographic information, the date of symptom onset, symptoms, and clinical information.
   b. When asking about exposure history (e.g., food, travel, activities), if possible, use the entire incubation period range of cryptosporidiosis (1–12 days). Specifically, however, focus on the time period around seven days prior to the case's onset, which is the average incubation period.
   c. If possible, record any restaurants at which the case ate, including food item(s) and date(s) of consumption. If you suspect that the case became infected through food, use the MDPH *Foodborne Illness Complaint Worksheet* (located at the end of this chapter) to facilitate recording additional information. It is requested that the LBOH fax or mail this worksheet to the MDPH Center for Environmental Health, Food Protection Program (FPP); see top of worksheet for fax number and address. This information is entered into a database to help link other complaints from neighboring towns, thus helping to identify foodborne illness outbreaks. *Note: This worksheet does not replace the MDPH Enteric Disease Case Report Form.*
   d. Ask questions about travel history and outdoor activities to help identify where the case became infected.
   e. Ask questions about water supply and exposure because cryptosporidiosis may be acquired through water consumption.
   f. Household/close contact, pet or other animal contact, daycare, and food handler questions are designed to examine the case's risk of having acquired the infection from or the case's potential for transmitting it to these contacts. Determine whether the case attends or works at a daycare facility and/or is a food handler.
   g. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the case report form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4: CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements *(105 CMR 300.200)*

Food handlers with cryptosporidiosis must be excluded from work.

Note: A case of cryptosporidiosis is defined by the reporting criteria in Section 2A of this chapter.

Minimum Period of Isolation of Patient

After diarrhea has resolved, food handling facility employees may only return to work after producing one negative stool specimen. If a case has been treated with an antimicrobial agent, the stool specimen shall not be collected until at least 48 hours after cessation of therapy. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to food handling duties.

Minimum Period of Quarantine of Contacts

Contacts who have diarrhea and are food handling facility employees shall be considered the same as a case and shall be handled in the same fashion. In outbreak circumstances, asymptomatic contacts that are food handling facility employees shall be required to produce 2 negative stool specimens 24 hours apart. No restrictions otherwise.

Note: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider. See Glossary (at the end of this manual) for a more complete definition.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Daycare

Since cryptosporidiosis may be transmitted from person to person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a daycare setting carefully. General recommendations include:

- Children with *Cryptosporidium* who have diarrhea should be excluded until their diarrhea is resolved.
- Children with *Cryptosporidium* who have no diarrhea and are not otherwise ill may be excluded or may remain in the program, if special precautions are taken.

Since most staff in childcare programs are food handlers, those with *Cryptosporidium* in their stools (symptomatic or not) can remain on site but must not prepare food or feed children until their diarrhea has resolved and they have one negative stool specimen (per *105 CMR 300.200*).

School

Since cryptosporidiosis may be transmitted from person to person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a school setting carefully. The MDPH *Comprehensive School Health Manual* provides detailed information on case follow-up and control in a school setting. General recommendations include:

- Students or staff with *Cryptosporidium* who have diarrhea should be excluded until their diarrhea is resolved.
- Students or staff with *Cryptosporidium* who do not handle food, have no diarrhea or have mild diarrhea, and are not otherwise sick, may remain in school if special precautions are taken.
- Students or staff who handle food and have *Cryptosporidium* infection (symptomatic or not) must not prepare food until their diarrhea is gone and they have one negative stool specimen (per *105 CMR 300.200*).

Refer to Chapter 8 of the MDPH *Comprehensive School Health Manual* for complete guidelines in handling diseases spread through the intestinal tract.

Community Residential Programs

Actions taken in response to a case of cryptosporidiosis in community residential programs will depend on the type of program and the level of functioning of the residents.

In long-term care facilities, residents with cryptosporidiosis should be placed on standard (including enteric) precautions until symptoms subside and they have a negative stool test for *Cryptosporidium*. Refer to the MDPH Division of Epidemiology and Immunization's *Control Guidelines for Long-Term Care Facilities* for further actions. A copy can be obtained on the MDPH website at www.mass.gov/dph/cdc/epii/ltcf/ltcf.htm or by calling (617) 983-6800 or (888) 658-2850. Staff members who give direct patient care (e.g., feed patients, give mouth or denture care, give medications) are considered food handlers and are subject to food handler restrictions under *105 CMR 300.200*. (See Section 4A for more information.) In addition, staff members with *Cryptosporidium* infection who are not considered food handlers should not work until their diarrhea is gone.

In residential facilities for the developmentally disabled, staff and clients with cryptosporidiosis must refrain from handling or preparing food for other residents until their diarrhea has subsided and they have one negative stool specimen for *Cryptosporidium* (per *105 CMR 300.200*). In addition, staff members with cryptosporidiosis who are not food handlers should not work until their diarrhea is resolved.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of cryptosporidiosis in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. A common vehicle (e.g., water, food, or association with a daycare center) should be sought, and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal hygiene and sanitary disposal of feces. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

Note: Refer to the MDPH's Foodborne Illness Investigation and Control Reference Manual for comprehensive information on investigating foodborne illness complaints and outbreaks. Copies of this manual have been made available to LBOH. It can also be located on the MDPH website in PDF format at www.mass.gov/dph/fpp/refman.htm. For the most recent changes to the Massachusetts Food Code, contact the FPP at (617) 983-6712 or through the MDPH website at www.mass.gov/dph/fpp.

D. Preventive Measures

Personal Preventive Measures/Education

To avoid exposure, recommend that individuals:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, and after contact with animals, especially cattle.
- Wash their own hands as well as the child's hands after changing diapers, and dispose of diapers in a sanitary manner.
- Wash their hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom, after using the toilet or helping someone use the toilet, after changing diapers, before handling food, and before eating.
- Avoid drinking raw milk, other unpasteurized dairy products, or unpasteurized apple cider.
- Avoid drinking water from streams or lakes. Avoid drinking unboiled water while traveling in developing countries or when the water quality is unknown. Bringing water to a full, rolling boil is sufficient to kill *Cryptosporidium*.
- Adhere to local advisories to boil water.

The likelihood that *Cryptosporidium* could cause illness in regulated, public drinking water is low. Immunocompromised individuals, however, may want to consider the following recommendations:

- Avoid fecal contact.
- Boil tap water before drinking or making ice cubes.
- Consider the use of a home water filtration system with a very fine filter (absolute pore size of one micron or smaller). Such filters include: reverse-osmosis filters, filters labeled as "absolute" one micron filters, and those labeled as meeting National Sanitation Foundation (NSF) standard #53 for cyst removal.
- Avoid swallowing water when swimming. Lakes, streams (and other surface waters), and swimming pools may be contaminated with *Cryptosporidium,* and chlorination does not eliminate the parasite.

Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g., dental dam) may prevent the spread of *Cryptosporidium* to a case's sexual partners and may prevent exposure to and transmission of other fecal-oral pathogens.

A Cryptosporidiosis Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control." The fact sheet is available in English and Spanish.

ADDITIONAL INFORMATION

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for cryptosporidiosis is the same as outlined in Section 2A of this chapter. CDC case definitions are used by the MDPH and the CDC to maintain uniform standards for national reporting. When reporting to the MDPH, always use the criteria in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

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FORMS & WORKSHEETS

Cryptosporidiosis

Cryptosporidiosis

LBOH Action Steps

This form does not need to be submitted to MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to cryptosporidiosis case investigation activities.

LBOH staff should follow these steps when cryptosporidiosis is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ❑ Notify the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any confirmed case(s) of cryptosporidiosis.
- ❑ Obtain laboratory confirmation.
- ❑ Identify potential exposure sources, such as a water source, diapered child, day care attendee, or food handler.
- ❑ Determine whether the case attends or works at a daycare facility and/or is a food handler.
- ❑ Identify other potentially exposed persons.
- ❑ Fill out the case report form (attach laboratory results).
- ❑ Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).